

PART F - DIVISION F2

DETAILED SPECIFICATIONS - TECHNICAL REQUIREMENTS

1. General: This specification provides technical information required for providing materials and technical services associated with modification of the Secondary Air Heaters on both Units 1 & 2. The Unit 2 Work is scheduled to begin February 28, 2004, and the Unit 1 Work is scheduled for March 5, 2005. Each outage is scheduled for the duration of 28 days.
2. Unit Description: IPSC consists of two (2) sister units each operating two, 33-1/2-VI-64 parallel Lungstrom/CE Secondary Air Heaters and two, 24-1/2-VI-44 parallel Lungstrom/CE Primary Air Heaters. The two units have experienced several uprates from their original full load output of 840MWg. The current full load design rating of both units is 950MWg. Site elevation is 4700 feet above sea level.

Only the Secondary Air Preheaters will be modified with these specifications.

The existing secondary air heaters consist of a three layer design as follows:

- Hot End Layer.....#22 Ga. 'DL' 36" depth low alloy/CR
- Hot Intermediate Layer.....#22 Ga. 'DL' 16" depth low alloy/CR
- Cold End Layer.....#18 Ga. NF-6 12" depth low alloy/CR

The existing drive train consists of a General Electric, 75 H.P., Frame 365-T motor coupled to a Philadelphia Gear 10 AP - 132:1.1 speed reducer. The fluid coupling provided and installed as original equipment at the motor/speed reducer interface is no longer in service. The speed reducers have been retrofitted, since original installation, with pump driven, oil cooler assemblies. The motors are connected to the speed reducer with conventional, spider couplings.

The support bearing consists of a Kingsbury, series 1450 thrust bearing and a SKF, #23244 CJ/C3/W33 radial bearing. The guide bearing consists of an SKF, #23192 radial bearing. The guide bearing lubrication circuits have also been modified for enhanced oil cooling.

3. Overall Schedule: The overall planned scope of work for modifications to the Secondary Air Heaters shall begin on February, 28 2004 during the scheduled unit outage. The same work shall be completed on the Unit 1 Secondary Air Heaters during the outage currently scheduled to begin March 5, 2005.
4. Contractor Scope of Work: This section defines the Work to be completed by the Contractor within these specifications. The scope shall include design, manufacture and delivery of new, high-efficiency, secondary air heater rotor hardware for ensuring optimal thermal and air/gas differential performance and reliability as follows:

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- a. Latest technology secondary air heater basket supports, stay plates extensions, and elements as required. (Four air heaters total)
 - b. Basket Sealing Frames.
 - c. Special tools required for maintenance or adjustment of the new rotor hardware.
 - d. Five complete sets of latest design air heater rotor seals. (Two per unit plus one spare set). Seal sets to include all seals needed for complete rebuild of the air heater, including radial, circumferential, bypass seals, and all installation hardware as required.
 - e. Rotor seal clearance gauge assemblies sufficient for external indication of both the sector plate mid-span and outer tip on the hot end sector plates and the outer tip only on the cold end sector plates on all four secondary air heaters. (Total of 24 seal clearance gauge assemblies).
 - f. Engineering services including verification of acceptable bearing loads, mechanical drives, and structure.
 - g. Technical direction services for ensuring accurate and efficient installation of the new air heater hardware. This includes technical support for the project engineer in providing direction to the selected installation contractor through all phases of the project scope.
 - h. Field engineering services for on-site direction during installation of the secondary air heater modifications as listed in Section 6. Field engineering services shall include technical direction to both IPSC and the installation contractor during mobilization/staging, installation, startup and testing of the air heaters in service.
 - i. On-site training for Operations/Maintenance/Engineering personnel regarding air heater performance parameters, recommended maintenance practices, and procedures and best operating practices for both the primary and secondary air heaters. Training agenda to be prepared based on three separate sessions of approximately three hours each over 2 to 3 days. Groups of up to thirty (30) people will be invited to attend one of the three training sessions. The training classes shall be taught by both the Field Engineer and the Project and/or Design Engineer.
5. Design Conditions and Performance Criteria: The justification for this project rests on both performance and fan capacity recovery. Therefore, all possible effort shall be made to identify and incorporate the most current and proven performance related

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technologies.

- j. Air heater elements shall be minimum 22 USS gage. Deviation from this requirement must justified in the bidders proposal.
- k. All air heater elements shall be reversible with no impact on air heater performance.
- l. All element baskets shall be designed for side removal and access.
- m. The bidder shall clearly identify all alloys used in the new rotor components provided.
- n. The successful bidder shall provide procedures for ensuring that design dimensions, clearances and rotor alignment are maintained during installation.

The secondary air heater internals shall be designed to eliminate failure of any component due to erosion, oxidation/ corrosion and structural failure for a minimum period of 20 years when operated within the following conditions:

Please refer to Appendix 1 and 2 for additional information and fill in the operating parameters for the following conditions.

Secondary Air Heater Operating Conditions for 20 Year Life			
	Minimum	Maximum	Design
Inlet Gas Temperature [°F]			
Inlet Air Temperature [°F]			
Gas Temperature Differential [°F]			
Air Temperature Differential [°F]			
Gas Velocity [lbs/hr]			
Air Velocity [lbs/hr]			
Inlet Pressure Differential [in. w.g.]			
Outlet Pressure Differential [in. w.g.]			
Hot End Sootblowing Cycles at 150psi			
Cold End Sootblowing Cycles at 150psi			

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6. Field Service Engineering: Unless agreed to otherwise, in writing, by IPSC, Mr. Harlan Fennemore shall serve as the Field Service Engineer/ OEM Technical Representative for the secondary air heater modifications. The Field Service Engineer shall arrive on site no later than one (1) week prior to the respective outage scheduled start dates. The Field Service Engineer shall be available in accordance with the planned outage shift schedule, from one (1) week prior to the outage scheduled start date, until at least one week following full load operation of the respective unit. Total duration of onsite stay will be approximately 6 weeks. The Field Service Engineer shall provide the following services:
- a. Technical direction to IPSC for disassembly, cleaning, inspection, repair, part replacement, reassembly, sector plate assembly rotor alignment, balancing, etc., of the secondary air heater components.
 - b. Assist IPSC with overhaul planning, schedule preparation, and schedule updating both before and during the installation outage. Approximately 12 weeks prior to the outage, the Field Service Engineer shall travel to the site and participate in a finalization planning meeting for the installation outage.
 - c. Shall be onsite to receive and inspect all components as provided by the bidder to ensure no damage occurred during shipping and all required components are onsite.
 - d. First outage only, conduct an on-site, off-line inspection of the Unit 2 Primary Air Heaters as early in the outage as possible without impacting the ongoing work on the Secondary Air Heaters. Also complete an on-line inspection of the Unit 1 Primary and Secondary Air Heaters at some time during the Unit 2 Outage.
 - e. Prepare and submit to IPSC a technical report which details the inspections, repairs, and future maintenance and operating recommendations related to the modifications completed and the status and condition of all air heaters inspected.
 - f. First Outage only, prepare an agenda for an on-site air heater training class covering aspects of control, performance and maintenance on the secondary and primary air heaters. Submit agenda to the Contract Administrator. Field engineer shall participate in three separate 3 hour training sessions held at the site.
 - g. Additional support and coordination as required to insure a smooth installation and startup.

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7. IPSC Provided Facilities: IPSC shall provide the following services at the designated location for use within the Contractor's trailer:
- A single telephone line (Contractor shall arrange with phone company for service)
 - A single fax line (Contractor shall arrange with phone company for service)
 - 120VAC power for trailer lighting/heating
8. Operating Experience: Intermountain Generating Station consistently operates with net capacity factors in excess of 90 percent, and net output in excess of 95 percent. With the current three layer design secondary air heaters, IPSC Operations has often felt it necessary to complete up to 4 blowing sequences every 24 hours. Normal air heater cleaning requirements have averaged approximately 2 blowing sequences every 24 hours.
9. Maintenance History and Provisions: Modifications to the secondary air heaters have been performed by IPSC personnel under the direction of an authorized Field Service Engineer. In addition to normal maintenance, the secondary air heaters have received the following modifications:
- Tilting sector plate modifications
 - Guide bearing seal modifications
 - Auxiliary gear box oil cooling skid
 - Electric drive hydraulic coupling removal
 - Sector plate digital position control system upgrade
- Details of these modifications can be provided upon written request from the bidder.
10. Manufacturing Schedule: Within four (4) weeks of Contract award, the Contractor shall submit a detailed schedule showing all facets of procurement, fabrication and delivery the secondary air heater upgrade and associated components. The schedule shall include:
- a. Order placement for material stock for each major component.
 - b. Expected delivery to manufacturing facilities of stock for each major component.
 - c. Verification of fabrication dimensions.
 - c. Component fabrication.
 - d. Component Assembly.
 - e. Final assembly dimensional verification at manufacturing facility.
 - f. Preparations for shipping.

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- g. All Materials and components shipped from fabrication facility.
 - h. All Materials and components delivered to site no later than February 1st for each outage..

Updated manufacturing progress reports shall be prepared and submitted in writing to IPSC on a monthly basis starting the first month after Contract award and continuing up to the date of final inspection and shipment.

- 11. Air Heater Performance Testing: IPSC shall at their expense, and using plant equipment, shall carry out a secondary air heater performance verification test for verification of bid design performance parameters. This test shall be within Sixty (60) days after the unit is on-line and stable. Air heater performance testing shall be based on the latest edition of the accepted standard for air heater performance testing ASME PTC-4.3.
- 12. Contract Document Submittals: During the course of fabrication and installation of the secondary air heater modification hardware, the successful bidder shall submit, at a minimum, the following information in accordance with the monthly updated manufacturing schedules and reports outlined in Section 10 of this Division. As-built or updated drawing revisions shall be prepared and submitted following installation of each units respective secondary air heater modifications.

Schedule of Submittals		
No.	Item	Time of Submittal
1	Completely fill out section D2-5 para. 5 and Appendix 1 of this contract.	Return with Bid Documents
2	Bidder shall provide all recommended requirements for ASME PTC4.3 section 3.01. This list shall specifically show recommended list of tolerances for acceptance testing as per ASME PTC4.3 section 3.01.12 and 3.03. Including allowable measurement, calibration, and final result errors. In addition, the bidder shall also define recommended conditions for inlet air steady state for commencement of acceptance tests and parameter that define a failed test per ASME PTC4.3 section 3.10.	Preliminary -Return with Bid Documents Final - To be negotiated prior to Contract Award
3	Bill of Materials including materials used, method of manufacturing, and manufacturing agent.	Return with Bid Documents

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4	Air heater differential and thermal performance curves including: <ul style="list-style-type: none"> • Load vs. pressure drop curves • Load vs. air outlet temperature curves. • Load vs. gas outlet temperature curves • Load vs. air heater leakage curves 	Return with Bid Documents
5	Manufacturing progress reports as detailed above.	Monthly - After Contract Award
6	Assembly Drawings	Six (6) Weeks After Contract Award
7	Modification details to any existing air heater components, including clearances	Six (6) Weeks After Contract Award
8	Rotor Design Seal Clearance Drawings	Twelve (12) Weeks Prior to Outage
9	Rotor Alignment Drawings	Twelve (12) Weeks Prior to Outage
10	Component and assembly rigging plan including accurate weight of each lift	Twelve (12) Weeks Prior to Outage
11	Air heater material mill certificates	Twelve (12) Weeks Prior to Outage
12	As built drawings and Owners Manuals	Two (2) Weeks After Shipment

Where final revisions of the above documents are not readily reproducible by IPSC the successful bidder shall provide ten (10) copies upon request.

13. Shipping: All components and assemblies shall be packaged, coated, supported, and secured to prevent corrosion, damage, or deformation during shipping. Any damage sustained prior to delivery to the Intermountain Generating Station shall be judiciously corrected by and to the account of the successful bidder.

Rest of document to be placed in other sections!

Liquidated Damages: The successful bidder shall be penalized for substandard execution of delivery and hardware performance, in accordance with the following provisions:

- a. If the successful bidder fails to meet the delivery schedule, as requested in Division D2 Section 10h, for each respective outage, the Contractor shall pay for all costs associated with mobilization and demobilization incurred by the installation contractor plus a boiler performance penalty of \$50,000, representing a small fraction of the savings lost by the Owner.
- b. If the heat transfer surface is installed in accordance with the plans and specifications and under direct supervision of a Technical Services Representative provided by the bidder, then if the conditions (or a set of conditions adjusted and normalized for actual operating parameters) supplied by the bidder in Appendix A are not met, the successful bidders liability shall be limited to, at the bidders option, the necessary repairs, replacements or modifications to permit such performance, or in lieu thereof, may pay IPSC as liquidated damages in full satisfaction of the failure to meet this performance guarantee, an amount equal to the lesser of \$5,000 per °F, above the guaranteed exit gas temperature, plus 1% of the purchase price of the heating elements for each full inch W.G. that the air or gas side pressure drops are above the guarantee value, or 10% of the purchase price of the heating element, excluding freight.

To establish non-compliance with this guarantee, IPSC shall at their expense, and using plant equipment, conduct testing procedures in compliance with the Air Heater Test Code, ASME PTC-4.3, within sixty (60) days after initial operation. The bidder shall supply, at the bidders cost, a representative to witness and validate the testing procedures and results. If a representative is not supplied, the bidder shall be responsible for all cost associated with validating the results as provided by IPSC.

- c. If the heat transfer surface is installed in accordance with the plans and specifications and under direct supervision of a Technical Services Representative provided by the bidder, then the amp draw produced by the drive motors discussed in Division D2 Section 2 shall not increase upon the completion of the installation.

Provided the above conditions are satisfied, the successful bidders liability shall

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be limited to, at the bidders option, the necessary repairs, replacements or modifications to permit such performance, or in lieu thereof, may pay IPSC as liquidated damages in full satisfaction of the failure to meet this performance guarantee, an amount equal to the lessor cost of the increase in power consumption for 10 years (calculated at \$0.025/KWH), or 10% of the purchase price of the heating element, excluding freight.

To establish non-compliance with this guarantee, IPSC shall at their expense measure amp draw on each drive motor at a recorded unit load, within thirty (30) days of the scheduled outage and again within sixty (60) days after initial operation. The amp draw readings shall be at unit loads greater than 800 MW. The bidder shall supply, at the bidders cost, a representative to witness and validate the testing procedures and results. If a representative is not supplied, the bidder shall be responsible for all cost associated with validating the results as provided by IPSC.

The provisions set forth in this section supercede any and all performance guarantees and statements of liquidated damages that shall be provided in the bidders proposal.

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APPENDIX 1

Please provide the following information and return with bid documents. Base your calculations on provided information and the ultimate analysis of fuel provided in Appendix 2

Operating Conditions (Per Rotor)

Air Entering	6,030,470	lb/hr
Air Enter Temp	67	°F
Gas Entering	7,132,104	lb/hr
Gas Enter Temp	751	°F
Site Elevation	4700	Ft

Guaranteed Performance

Air Side dP		Inches W.G.
Air Leaving Temp		°F
Gas Side dP		Inches W.G.
Gas Leaving Temp		°F

Assumptions (attach additional sheets as necessary)

Allowable Leakage		lb/hr
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APPENDIX 2

Ultimate Fuel Analysis

Provided on separate page...

LIST OF SUGGESTED BIDDERS

TEI Construction Services, Inc.
Attn: Charles A. Steede
7870 Schillinger
Park West
Mobile, AL 36608
Tel: 251-633-4181
Fax: 251-633-4158

Maintenance Enterprises, Inc.
Attn: Mike Simonds
703 E. Gardena Blvd
Gardena, CA 90248
Tel: 310-239-0004
Fax: 310-329-0006

ALSTOM Power, Inc.
Jerry Bennett
2360 Northwest Marine Drive
Troutdale, OR 97060
Tel: 503-669-1591
Fax: 503-669-0710

PART C - DIVISION C2**BIDDING DOCUMENTS - PROPOSAL SCHEDULE**

Proposal is hereby made to furnish and deliver to IPSC manpower, tools, and consumable material as required for **installation of Alstom Power Ljungstrom® Air Preheater Clearflow™ Rotor Modification Hardware and Heat Transfer Baskets on a total of four (4) Secondary Air Heaters in Units 1&2**, F.O.B. Intermountain Power Service Corporation, 850 West Brush Wellman Road, Delta, UT, in accordance with **Specifications XXXXX**, and the following:

Bid Submittals: Each bidders shall include the following information with their bid:

- a. Proposed Installation Plan
- b. Proposed Subcontractor List (including contacts, references and phone numbers.) All subcontractors shall be approved by the Contract Administrator prior to mobilization.
- c. Schedule of labor rates for Time and Material Work.

Prices: Bidders shall complete and submit the following pricing schedule. Prices are to be stand-alone, line item pricing unless specified otherwise by the bidder or indicated otherwise within the following line items.

<u>ITEM</u>	<u>BID</u>
Installation of Ljungstrom® Air Preheater Clearflow™ Rotor Modification Hardware and Heat Transfer Baskets for Secondary Air Heaters	\$ _____

Cash Terms: A discount for prompt payment is offered of _____ percent for Contract payments made within _____ calendar days after date of acceptance or delivery and receipt of invoice.

Taxes: The foregoing quoted prices are exclusive of all applicable sales and use taxes.

Form of Business Organization: The bidder shall state below the form of its business organization.

Bidder is: _____ (Corporation, Partnership, Limited Partnership, Individual)

If a partnership, the bidder shall state below the names of the partners. If a corporation, the bidder shall state below the names of the president and of the secretary.

Person to Contact: Should IPSC desire information concerning this Proposal, please contact:

Name: _____ Telephone No: _____

Address: _____

PART D - DIVISION D1**CONTRACT DOCUMENTS**

The documents listed in the Table of Contents, the reference specifications, any documents listed below, and the bidding documents as expressly agreed to by IPSC shall constitute the Contract. Said documents are complementary and require complete and finished work. Anything shown or required of the Contractor in any one or more of said documents shall be as binding as if contained in all of said documents. The Contractor shall not be allowed to take advantage of any error, discrepancy, omission, or ambiguity in any document, but shall immediately report to the Chief Operations Officer, in writing, any such matter discovered. The Chief Operations Officer will then decide or correct the same and the decision will be final.

Drawings: The following drawings are being provided for reference purposes only. They should be considered preliminary. Dimensions on these drawings are not guaranteed by IPSC. Alstom Power Air Preheater Company will supply final drawings 12 weeks prior to the outage.

<u>Drawing Number</u>	<u>Drawing Name</u>
62.3401.05-10038	SAH General Arrangement
62.3401.05-10039	SAH General Arrangement Details
935428	Rotor Assembly
935435	Module Assembly
ALSTOM Sketch	Rotor Modifications
SK-010513	Basket Sealing Bar Installation
78077	Radial Seal Ass'y
99297	EE-ZEE(TM) Bypass Seal Field Ass'y
78075	Axial Seal Assembly

Drawings prepared by the Contractor for this project shall be submitted to the Owner for review prior to commencement of fabrication. This review shall not relieve the successful bidder of sole responsibility for the adequacy and correctness of the associated work. All project drawings shall be stamped by a registered professional engineer, licensed within the state of Utah

PART F - DIVISION F1

DETAILED SPECIFICATIONS - SPECIAL CONDITIONS

1. General: This specification provides technical information required for providing manpower, tools, and consumable material associated with modification of the Secondary Air Heaters on both Units 1 & 2. Hardware to be installed will be supplied by others.
2. Overall Schedule: The overall planned scope of work for modifications to the Secondary Air Heaters shall begin on February, 28 2004 during the scheduled unit outage. The same work shall be completed on the Unit 1 Secondary Air Heaters during the outage currently scheduled to begin March 5, 2005. Each outages will last for the duration of 28 days. Contractor shall arrive onsite to allow sufficient time for mobilization and staging activities prior to each outage.
12. Liquidated Damages: The Contractor shall be penalized for substandard performance, in delivery and installation, in accordance with the following provisions:
 - a. If the Contractor is not prepared to proceed with the approved Installation Plan at the start of each respective outage, the Contractor shall pay for all costs associated with mobilization and demobilization incurred by the Contractor plus a boiler performance penalty of \$50,000, representing a small fraction of the cost incurred by the Owner.
 - b. For each day, at the start of each respective outage, that the Contractor is unprepared to execute the approved Installation Plan, the Contractor shall be assessed a penalty of \$50,000.00, up to a maximum of 10 days or \$500,000.00 .
 - c. For each day or portion thereof, that the Contractor exceeds the respective 28 day outage end date, the Contractor shall be penalized \$100,000.00. The maximum penalty for extending a single unit outage shall be 10 days or \$1,000,000.00
 - d. The Contractor shall be allowed to avoid one day of penalty associated with exceeding the 28 day outage end date, should such occur, if all materials and equipment are staged at the site in accordance with the approved Installation Plan, at least one week prior to the outage start date.
11. Typical Site Weather Conditions:

The average daily temperature at the plant site is 90°F in summer and 45°F in winter. During winter it is common for the temperature to stay below 10°F for up to two (2) weeks. Winter snow is a common occurrence and can stay on the ground for extended periods. The airheaters are located indoors but are open to ambient conditions during outages. The Contractor shall come prepared for temperature extremes.

PART F - DETAILED SPECIFICATIONS

DIVISION F2 - DETAILED REQUIREMENTS

1. General: This specification provides technical information required for providing manpower, tools, and consumable material associated with modification of the Secondary Air Heaters on both Units 1 & 2. Hardware to be installed will be supplied by others.

A primary focus of this contract shall be the optimization of the work to occur during Unit offline hours. Detailed planning of the contract work scope shall include a level of redundancy in consumable materials, equipment and manpower to ensure that guaranteed schedules are achieved.

2. Unit Description: IPSC consists of two (2) sister units each operating two, 33-1/2-VI-64 parallel Lungstrom/CE Secondary Air Heaters and two, 24-1/2-VI-44 parallel Lungstrom/CE Primary Air Heaters. The two units have experienced several uprates from their original full load output of 840MWg. The current full load design rating of both units is 950MWg. Site elevation is 4700 feet above sea level.

Only the Secondary Air Preheaters will be modified with these specifications.

The existing secondary air heaters consist of a three layer design as follows:

- Hot End Layer.....#22 Ga. 'DL' 36" depth low alloy/CR
- Hot Intermediate Layer.....#22 Ga. 'DL' 16" depth low alloy/CR
- Cold End Layer.....#18 Ga. NF-6 12" depth low alloy/CR

The existing drive train consists of a General Electric, 75 H.P., Frame 365-T motor coupled to a Philadelphia Gear 10 AP - 132:1.1 speed reducer. The fluid coupling provided and installed as original equipment at the motor/speed reducer interface is no longer in service. The motors are connected to the speed reducer with conventional, spider couplings. The speed reducers have been retrofitted, since original installation, with pump driven, oil cooler assemblies.

The support bearing consists of a Kingsbury, series 1450 thrust bearing and a SKF, #23244 CJ/C3/W33 radial bearing. The guide bearing consists of an SKF, #23192 radial bearing. The guide bearing lubrication circuits have also been modified for enhanced oil cooling.

3. Contractor Scope of Work: This section defines the hardware as it is to be installed by and Work to be completed by the Contractor within these specifications. The scope

shall include installation of Ljungstrom® Air Preheater Clearflow™ Rotor Modification Hardware and Heat Transfer Baskets as follows:

- a. Cold end stay plate extensions with basket support bars. Total of 144 extensions per air heater rotor.
 - b. Basket Sealing Frames. Total of 168 frames per air preheater.
 - c. Cold end basketed heating elements, with type DL7™ 20 gauge low alloy steel with liners. Total of 336 baskets per layer/air preheater.
 - d. Hot end basketed heating elements, with type DL7™ 22 gauge low alloy steel with liners. Total of 336 baskets per layer/air preheater.
 - e. Complete set of radial, Ee-zee™ bypass, axial, and post seals with holding strips and fasteners.
 - f. Hot and cold end seal clearance gauges for installation into the sector plates. To be located at the sector plate mid-span and outer tip on the hot end sector plates and the outer tip only on the cold end sector plates on all four secondary air heaters. Total of 6 per air preheater.
 - g. General repair and refurbishment of air heater structure. This work will be performed on a Time and Materials basis.
 - h. Provide scaffold, access, and rigging as needed. All scaffold and access hardware shall be OSHA approved structures. The Owner shall be allowed access to scaffold and other access provisions in any areas required. This work will be coordinated through the Contract Administrator or designee in a manner aimed at minimizing contractor schedule impacts.
 - i. Approximately 12 weeks prior to each scheduled outage, the onsite supervisor/superintendent shall travel to the site and participate in a finalization planning meeting for the installation outage.
 - j. The Contractor shall be responsible to maintain his work areas in an organized and safe manner throughout the execution of the Installation Plan. IPSC shall retain the right to assess and require correction of any areas or situations it deems as impacting ongoing operations and maintenance. Waste material produced during a shift shall be disposed of by the end of the following shift. At the conclusion of each outage, the Contractor shall ensure that all work areas associated with this contract are restored, replaced and/or cleaned in a manner similar or better in appearance to that found prior to the outage.
4. Field Service Engineering: IPSC shall provide a Field Service Engineer. The Field Service Engineer shall be contracted through the manufacturing agent providing the air heater hardware. The Field Service Engineer shall provide the following services:

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- a. Technical direction to contractor for disassembly, cleaning, inspection, repair, part replacement, reassembly, sector plate assembly, rotor alignment, balancing, etc., of the secondary air heater components.
 - b. Assist IPSC and contractor with overhaul planning, schedule preparation, and schedule updating both before and during the installation outage. Approximately 12 weeks prior to the outage, the Field Service Engineer shall travel to the site and participate in a finalization planning meeting for the installation outage.
 - c. Shall be responsible for inspection and certification of hardware once received onsite.
 5. Schedules: Unit 2 Work is scheduled to begin February 28, 2004, and the Unit 1 Work is scheduled for March 5, 2005. Each outage is scheduled for the duration of 28 days.
 - a. All bidders shall provide a guaranteed installation schedule as part of the proposed Installation Plan submitted with each bid package.
 - b. The proposed Installation Plan shall be developed to ensure completion of all work required for normal operation of the air heaters within a maximum of 26 days.
 - c. Work not requiring the unit to be off-line, such as mobilization, staging, access provision work, demobilization etc. shall be clearly identified on the proposed Installation Plan and can be coordinated outside this outage window, with approval of the Contract Administrator.
 - d. The bidders shall provide a schedule of costs associated with an IPSC scheduled delay of the outage start date in one week increments up to a one month. These costs shall be based on notification from IPSC one (1) month prior to the scheduled outage start dates and a second schedule based on notification from IPSC one (1) week prior to the scheduled outage start dates.
 - e. Unless otherwise noted in these Specifications, IPSC facilities and equipment shall not be used in support of this work. To prevent delays, caused by equipment breakdown, the Contractor shall provide spare tools and equipment at the jobsite in reasonable quantities in anticipation of equipment failures.
 6. Installation: Each bidder shall prepare and provide, with each bid package, a proposed Installation Plan showing project progress on a daily basis beginning with initial equipment delivery and ending with site clean up and exit.
 - a. The proposed Installation Plan, submitted with the bid package, shall be the basis for development of the approved Installation Plan forming a part of the eventual contract governing this work. The approved Installation Plan shall be used as the basis for instituting mid-outage resource corrections and for calculating any penalties associated with completion of the work scope.

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- b. The proposed Installation Plan shall include detailed information regarding each task within the contract scope, including:
- Equipment Mobilization
 - Equipment and Component Staging
 - Manpower Loading Throughout the Contract
 - Existing Equipment Removal
 - New Equipment Installation
 - Material Equipment Removal and Area Clean-up
 - Air Heater Released to Operations - Guaranteed Date
- c. The proposed Installation Plan, to be included as part of the submitted bid, shall include estimates of all required on-site services, with clear identification of each request for service to be provided by IPSC. These estimates shall include power service requirements for running all electrical equipment and compressed air requirements. Authorization for connection to and use of requested power, compressed air or other on-site services must be coordinated and approved by the IPSC Contract Administrator.
- d. At least two (2) months prior to mobilization to the site, the successful bidder shall provide a detailed material 'Laydown Plan' for the estimated 22 flat bed semitractor trailer loads of material. This plan shall be used for coordination of area utilization and access. The Laydown Plan shall address staging and temporary storage requirements for all associated materials and equipment in order to minimize interference with ongoing plant operations and outage work. This plan shall be submitted to and approved by the Contract Administrator prior to receiving any contract materials, equipment or craft personnel on-site for the outage work.
7. Safety: The Contractor agrees it is familiar with the risks of injury associated with the work, has reviewed the work to be performed, inspected the job site with an IPSC representative, and has determined that no unusual or peculiar risk of harm exists with regard to the work to be performed at the job site.

The Contractor further agrees it shall, at all times, provide at the job site a competent supervisor(s) familiar with IPSC's and the industry's safety standards to ensure compliance with all federal, state, and local regulations pertaining to safety, including, but not limited to, Federal and State OSHA, as said regulations relate to the work to be performed under the Contract. Although IPSC assumes no responsibility to oversee or supervise the work, IPSC reserves the right to review safety programs and practices and make recommendations to the Contractor. Any such review or recommendation by IPSC will not increase IPSC's liability or responsibility and shall not relieve the Contractor from providing a safe work environment and complying with legal requirements.

The Contractor shall comply with IPSC's safety and equipment requirements prior to starting work. Worker protective clothing, which includes, but is not limited to, hardhats,

safety glasses, safety shoes, gloves, respirators, earplugs, safety harnesses, and face shields shall be provided by the Contractor.

Prior to starting work, all of the Contractor's personnel shall attend a safety orientation taught by a representative of IPSC. At the Contractor's option, a supervisor may attend the orientation taught by IPSC, then present the orientation to the remainder of the Contractor's personnel. In this case, a roll shall be given to IPSC which lists each person who received the orientation and the date it was received.

The Contractor shall be responsible to provide and manage an acceptable safety program.

- a. The Contractor shall provide a full-time Safety Representative. The Safety Representative shall act as the point of contact for all safety-related issues, conduct tailgate safety meetings prior to each shift, and may be assigned additional duties.
- b. The Contractor shall provide copies of written safety policies/plans to the Contract Administrator one (1) month prior to beginning work. These include, but are not limited to, Respiratory Protection, Confined Spaces, and Hazard Communication.
- c. Prior to flame cutting or welding in any location, the Contractor shall first obtain a Hot Work Permit. This permit will be coordinated by the Contract Administrator or designee. The permit lists mandatory safety precautions which shall be taken before, during, and after hot work.
- d. The Contractor shall ensure that its employees perform work in accordance with all applicable federal, state, and local safety and health regulations. The IPSC Safety Section personnel will periodically monitor the job site. If violations are noted, they will be reported to the Contractor's onsite Supervisor and the Contract Administrator for appropriate action.
- e. The following table is a list of anticipated safety hazards and personal protective equipment needed in the contract area. This must not be considered a complete listing of all potential hazards. The Contractor shall provide appropriate personal protective equipment to its employees to protect against these hazards and others as they are identified :

Hazard	Needed Safety Equipment
Hazardous noise.	Earplugs and/or muffs.
Toxic fumes and/or vapors from welding, grinding, or solvent type cleaning.	Preparing for proper working atmosphere in and around the boiler requires specific preparation by the contractor.
Head injuries from falling material or bumps.	Hard hats.

Burns from welding and cutting.	Gloves, long sleeve shirts, and welding leathers.
Foot injuries from dropped tools or equipment.	Steel-toed boots.
Eye and face injuries.	Safety glasses and face shields.

8. Quality Assurance/Quality Control:

- a. The Owner reserves full access rights for quality assurance inspections of ongoing work..
- b. The Contractor shall provide, within the proposed Installation Plan, a Quality Control Plan, identifying the procedures and acceptance criteria to govern the work.
- c. The Contractor shall submit certified weld procedures and welder qualification records for each welder employed, to the IPSC Contract Administrator prior to beginning work.
- d. A substandard weld shall be defined as any weld declared substandard in the opinion of the IPSC Contract Administrator or designee. The AWS codes will form the basis of the acceptability determination.
- e. Completed welds shall be smooth and free of undercutting, cavities, depressions, cracks, surface porosity, weld craters, overlaps, and abrupt ridges. All welds shall meet the specifications of the applicable sections of AWS.

9. Available On-Site Services: Unless otherwise arranged, in writing, with the Contract Administrator, on-site services shall be provided in accordance with this section. Services not covered in this section shall be provided by the Contractor.

12. IPSC Provided Facilities: IPSC shall provide the following services at the designated location for use within the Contractor's trailer:

- A single telephone line (Contractor shall arrange with phone company for service)
 - A single fax line (Contractor shall arrange with phone company for service)
 - 120VAC power for trailer lighting/heating.
- a. IPSC will make potable water, compressed air (small volume only), and electricity available at 460V and 120V. Connections to IPSC electric or water systems shall be made only by IPSC employees unless approved otherwise in writing for each specific location. The Contractor shall identify all service connection requirements within the proposed Installation Plan.

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- b. The Contractor shall provide enough sanitary facilities for its employees. Contractor employees are prohibited from using the permanent restroom facilities at the site.
 - c. Equipment and material staging requirements shall be clearly detailed within the successful bidders site Laydown Plan submitted to the Contract Administrator at least two months prior to the outage start date. Actual placement of materials and equipment shall be coordinated with the Contract Administrator.
 - d. The Contractor shall maintain a clean work space. The Contractor shall clean the work site at least daily. This includes, but is not limited to, picking up trash, sweeping, and washing the area as necessary, straightening cords and hoses, organizing tools and equipment, and emptying trash receptacles. IPSC will provide trash collection containers (dumpsters) for the Contractor's use, outside the generation building at ground level. IPSC will empty these containers as needed.
 - e. IPSC will provide general fire protection and first aid services. Provisions for local fire extinguishing , such as weld slag induced fires, shall be provided by the Contractor. All workplace injuries shall be reported to the IPSC First Aid Clinic and the Contract Administrator.
 - g. IPSC will not provide office or administrative space or off-site telephone service to the Contractor; however, IPSC will make an on-site telephone line available to the Contractor at a specific, office-trailer-ready location, if requested. The Contractor shall make its own arrangements for "off-site" and long distance phone service.
10. Site Security and Access: The Intermountain Generating Station has an existing fence and security system to restrict access to the site. However, the construction site will not be fenced separate from the rest of the plant site and will therefore be accessible by all those approved for site access. It is the contractors responsibility to protect themselves and their equipment and tools from theft and vandalism as they deem necessary. IPSC will not be responsible for any theft or damage incurred by the contractor.

The Contractor and its employees, agents, representatives, and/or subcontractors, while performing work or services on IPSC premises, shall fully comply with all fire prevention, security, and safety rules in force at IPSC. The Contractor and its employees, agents, representatives, and/or subcontractors personnel and vehicles are subject to a random inspection of his/her person and/or vehicle upon entering, working on, and departing the plant site.

The Contractor will be directed to specified areas for parking vehicles and equipment by the Contract Administrator. Certain areas of the IPSC plant site are restricted to IPSC vehicles only. Exceptions to the parking restriction will be made on an as needed basis through the Contractor's respective Contract Administrator. The Contractor shall make its employees, agents, representatives, and/or subcontractors aware of all areas that are subject to restricted parking.

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- a. Only vehicles owned and insured by the Contractor or an approved sub-contractor will be allowed inside the plant fence perimeter. All other contractor employees shall park their vehicles outside the fence perimeter at Guard Post #1 located southwest of Unit 2. The contractor shall be responsible for transport of the employees to and from Guard Post #1 and the jobsite. The contractor shall not use the back of trucks for employee transport.
 - b. All contractor employees will be given security badges by the owner and those badges shall be displayed each day to gain admittance to the plant site. All security badges shall be returned to the security contractor when the employee terminates their work at this site. All contractor vehicles will also receive parking stickers from the security contractor allowing entrance to the plant site. Temporary badges and parking stickers are available for intermittent contractor employees and vehicles.

11. Handling and Storing:

- a. Handling: Once the IPSC provided materials have been received onsite by the Field Service Engineer and all damage noted the material shall be turned over to the contractor. At that time the Contractor shall be responsible for any damage to equipment and materials until final acceptance of the work.
- b. Storage: All equipment, materials, and supplies not immediately incorporated in the work shall be placed in storage. Storage areas will be allocated and assigned by the Project Manager but, will be in general area of the work. The storage areas shall be kept clean and orderly at all times.

Capital Project IGS03-02

Scope of Work

History

Aging of air heater heat transfer elements have raised questions regarding both performance and structural integrity of the transfer surface. Significant advances in air heater technology, since initial installation, now afford us valuable alternatives for air heater and system performance improvement.

An assessment of the secondary air heaters shows that upgrade of the element systems on these heaters will provide both performance and reliability benefits. Changeout of the primary air heater elements is not economically justifiable at this time.

There are only two alternative designs currently available for consideration for element replacement. These are:

- Air Preheater Company's (Alstom) replacement-in-kind
- Air Preheater Company's (Alstom) ClearFlow® upgrade

Replacement In-kind

In-kind Replacement would consist of replacement of DL elements and general air heater refurbishment. It would restore the air heaters to design specifications. Lost performance would be regained, but no additional capability provided.

ClearFlow

There are several advantages to the Alstom ClearFlow upgrade.

First, the ClearFlow upgrade will eliminate the support grating between the soot blower and the element sheets used to support each element. Instead, stay plates installed between the diaphragms will carry the element baskets. Presently, the area behind the support grating bars is not easily cleaned, as a result of obstructions to the cleaning media.

Secondly, going to the two layer element design isolates the fouling zone to the cold end layer. Since this area is where the soot blowing energy is maximized, fouling is conversely minimized. When the soot blowing media leaves the element layer, the media energy dissipates to the sides and energy is lost rapidly. This occurs on each layer, so consequently in a three layer design the intermediate layer receives less cleaning energy and the hot end layer significantly less. In most cases, a ClearFlow up-grade requires less soot blowing frequency and lower soot blowing pressures thereby extending the life of the heating

element.

Lastly, with reduced obstruction and better cleanout, the fan power requirements are cut. This not only saves in power costs, but in the mechanical life of the fan.

DL7

A ClearFlow upgrade could use several different types of heating elements. Since each element profile is designed for a particular fuel or fouling problem, the optimized selection (for the proposed replacement) are the DL7 elements. The DL7 are a loose pack element, similar to the existing DL profile, but with a higher thermal performance, allowing a drop from 3 layers to 2.

Another option available with the ClearFlow up-grade is not only turning over (or flipping) the element baskets, as with the present heaters, but because both the hot end and cold end layers are the same depth (41"), the hot and cold end layers can be switched as the elements wear. This allows for more even wear on the hot and cold ends of each layer.

Scope

The hardware to be installed as part of this capital project shall include installation of Ljungstrom® Air Preheater Clearflow™ Rotor Modification Hardware and Heat Transfer Baskets as follows:

- a. Cold end stay plate extensions with basket support bars. Total of 144 extensions per air heater rotor.
- b. Basket Sealing Frames. Total of 168 frames per air preheater.
- c. Cold end basketed heating elements, with type DL7™ 20 gauge low alloy steel with liners. Total of 336 baskets per layer/air preheater.
- d. Hot end basketed heating elements, with type DL7™ 22 gauge low alloy steel with liners. Total of 336 baskets per layer/air preheater.
- e. Complete set of radial, Ee-zee™ bypass, axial, and post seals with holding strips and fasteners.

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- f. Hot and cold end seal clearance gauges for installation into the sector plates. To be located at the sector plate mid-span and outer tip on the hot end sector plates and the outer tip only on the cold end sector plates on all four secondary air heaters. Total of 8 per air preheater.
 - g. General repair and refurbishment of air heater structure. This work will be performed on a Time and Materials basis.

Design

The following chart shows expected performance after the upgrade.

	Original	Proposed
<u>Flow Rates</u> Lbs./Hr.		
Air Entering	5,498,660	6,104,140
Air Leaving	5,183,660	5,728,140
Gas Entering	6,285,500	7,132,104
Gas Leaving	6,600,500	7,508,104
<u>Temperatures</u> Deg. F		
Air Entering	64	67
Air Leaving	644	698
Gas Entering	736	751
Gas Leaving w/o Leakage	294	282
Gas Leaving w/leakage	284	272
Average Cold End	179	175
<u>Pressure Differential</u> In.W.G.		
Pressure Drop Air	1.95	3.50
Pressure Drop Gas	3.10	5.65
Hot End Differential	7.60	7.60
Cold End Differential	12.65	16.75
<u>Surface:</u>		
Hot End	DL/22/36"	DL7™/22/41"
Hot Intermediate	DL/22/16"	
Cold End	N6/18/12"	DL7™/20/41"